

## DOCUMENT RESUME

ED 449 962

SE 063 944

TITLE Project 2061: Science Literacy for a Changing Future. Update 1998-99.

INSTITUTION American Association for the Advancement of Science, Washington, DC.

SPONS AGENCY Carnegie Corp. of New York, NY.; John D. and Catherine T. MacArthur Foundation, Chicago, IL.; Andrew W. Mellon Foundation, New York, NY.; Pew Charitable Trusts, Philadelphia, PA.; National Science Foundation, Arlington, VA.

PUB DATE 1998-00-00

NOTE 25p.; For Update 1997, see ED 406 228. Also supported by the Robert N. Noyce Foundation.

AVAILABLE FROM American Association for the Advancement of Science, 1333 H Street NW, P.O. Box 34446, Washington, DC 20005. Tel: 888-737-2061 (Toll Free).

PUB TYPE Reports - Descriptive (141)

EDRS PRICE MF01/PC01 Plus Postage.

DESCRIPTORS Community; \*Educational Change; Elementary Secondary Education; \*Professional Development; \*Science Curriculum; Science Education; \*Scientific Literacy

IDENTIFIERS American Association for Advancement of Science; \*Benchmarks for Science Literacy; Project 2061 (AAAS); Science for All Americans

## ABSTRACT

This booklet describes Project 2061 and the strategies and tools for the improvement of education. It is divided into five sections: (1) Clear and Specific Learning Goals, which explains scientific literacy and defines the benchmarks for science literacy; (2) Preparation and Support for Teachers, which explains Project 2061 professional development programs and lists resources for science literacy; (3) Textbook and Test Alignment, which explains the steps of curriculum material analysis according to Project 2061; (4) K-12 Curriculum Coherence, which discusses strategies and techniques for aligning the entire curriculum to the standards; and (5) Community-wide Commitment, which explains the blueprint of the reform movement. (YDS)

# Project 2061

PERMISSION TO REPRODUCE AND  
DISSEMINATE THIS MATERIAL HAS  
BEEN GRANTED BY

*M. Koppal*

TO THE EDUCATIONAL RESOURCES  
INFORMATION CENTER (ERIC)

1

U.S. DEPARTMENT OF EDUCATION  
Office of Educational Research and Improvement  
EDUCATIONAL RESOURCES INFORMATION  
CENTER (ERIC)

☒ This document has been reproduced as  
received from the person or organization  
originating it.

☐ Minor changes have been made to  
improve reproduction quality.

• Points of view or opinions stated in this  
document do not necessarily represent  
official OERI position or policy.

SCIENCE LITERACY

FOR A

CHANGING FUTURE

BEST COPY AVAILABLE

BEST COPY AVAILABLE

American Association for the  
Advancement of Science

#### AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Founded in 1848, the American Association for the Advancement of Science is the world's largest federation of scientific and engineering societies, with nearly 300 affiliate organizations. In addition, AAAS counts more than 146,000 scientists, engineers, science educators, policy makers, and interested citizens among its individual members, making it the largest general scientific organization in the world. AAAS's goals are to further the work of scientists; facilitate cooperation among them; foster scientific freedom and responsibility; improve the effectiveness of science in the promotion of human welfare; advance education in science; and increase public understanding and appreciation of the importance and promise of the methods of science in human progress.

The AAAS wishes to express its gratitude to the following for their generous support of Project 2061:

Carnegie Corporation of New York  
John D. and Catherine T. MacArthur Foundation  
Andrew W. Mellon Foundation  
Robert N. Noyce Foundation  
The Pew Charitable Trusts  
National Science Foundation

© 1998 by the American Association for the Advancement of Science  
1333 H Street, NW, P.O. Box 34446, Washington, D.C. 20005



Project 2061 and the logo are federally registered trademarks of the  
American Association for the Advancement of Science, Washington, D.C.

I was lucky to be in school during the years right after the Sputnik launch when America vied with the U.S.S.R. to reach the moon. Spurred on by the space race, innovative programs in science and mathematics were widely available for students and teachers alike. I dreamt of becoming an astronomer and maybe even traveling in space. My great luck in fulfilling that dream on three space shuttle missions was certainly influenced by the science and mathematics training I received.



Astronaut George Nelson working on Comet Halley Active Monitoring Program in 1986.

Today's students are not so lucky. After the moon walk, America's focus turned away from science and mathematics education. The effects are still being felt. Despite some gains in test scores and other measures, many of our children—even those at the top of their class—will leave high school unable to meet the scientific and technological challenges of the 21<sup>st</sup> century. If we are to be a prosperous, just, and secure nation, this must change.



Washington, D.C., school children join Nelson in AAAS's Cabot Teaching Laboratory.

For the past 13 years, Project 2061 of the American Association for the Advancement of Science has worked to reform K-12 education so that *all* students are literate in science, mathematics, and technology when they graduate from high school. To achieve this, we must drastically reduce the amount of extraneous material covered in classrooms and focus on the key science, mathematics, and technology concepts that an adult in the 21<sup>st</sup> century needs to know. Under the inspired direction of Dr. F. James Rutherford, Project 2061 outlined such learning goals in its groundbreaking publications *Science for All Americans* and *Benchmarks for Science Literacy*. After I left NASA to begin teaching science, these books helped convince me of the merit of Project 2061's reform efforts. I jumped at the chance to join the staff in 1996 when Jim asked me to become deputy director. I was honored to become Project 2061's director earlier this year when Jim moved into his new role as education advisor at AAAS.

As I see it, Project 2061 is centered around key elements that must be achieved to bring about meaningful, lasting education reform. We need clear and specific learning goals for all students, and teachers who have the preparation and support to help students achieve those goals. Textbooks and assessments must align with learning goals and fit into a coherent, purposefully designed K-12 curriculum. Finally, we need communities that understand and are committed to long-term education reform.

In the following pages you can find out more about Project 2061 and our strategies and tools for improving education. We are very excited about our newest initiative, Project 2061 Professional Development Programs, which will enable us to provide benchmarks-based training to educators across America. And we hope that our latest publication, *Blueprints for Reform*, will stimulate much needed dialogue about systemic education reform.

We welcome your feedback and look forward to hearing your ideas on how we can work together more effectively on behalf of America's children.

Sincerely,

*George D. Nelson*

George D. Nelson  
Director, Project 2061

BEST COPY AVAILABLE

## CONTENTS

Clear and specific learning goals. ....	3
Preparation and support for teachers. ....	7
Textbook and test alignment . ....	10
K-12 curriculum coherence. ....	13
Community-wide commitment. ....	15
Project 2061 staff . ....	19
Information and ordering . ....	20

# CLEAR AND SPECIFIC LEARNING GOALS

IN JUNE 1985, THE YEAR HALLEY'S COMET SOARED ACROSS THE SKY, THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE (AAAS) CREATED A NEW LONG-TERM K-12 SCIENCE, MATHEMATICS, AND TECHNOLOGY EDUCATION REFORM INITIATIVE, PROJECT 2061. THE NAME EMBODIED THE IDEA THAT EDUCATION IS FOR A LIFETIME—MANY CHILDREN BORN IN 1985 (AND STARTING THE SEVENTH GRADE IN 1998) WOULD STILL BE ALIVE WHEN THE COMET RETURNED IN 2061. PROJECT 2061'S MANDATE WAS TO TRANSFORM EDUCATION IN AMERICA SO THAT ALL STUDENTS WOULD BE PREPARED TO LIVE INTERESTING, RESPONSIBLE LIVES DURING THIS 76-YEAR SPAN OF ACCELERATING SCIENTIFIC AND TECHNOLOGICAL CHANGE.

## Science for All Americans

Project 2061's first step was to set out recommendations for what all students should know and be able to do in science, mathematics, and technology by the time they graduate from high school. Five expert panels—whose members came from the biological and health sciences; social and behavioral sciences; physical and information sciences and engineering; mathematics; and technology—were convened to determine the concepts and skills most crucial to science literacy. Their recommendations were integrated into *Science for All Americans*, Project 2061's 1989 landmark document that defined science literacy and laid the groundwork for the subsequent science standards movement.

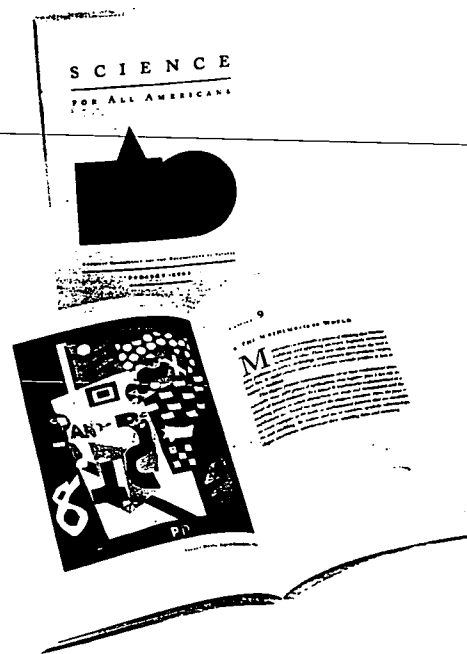
### What is Science Literacy?

*Science for All Americans* defines a science literate person as one who

- is familiar with the natural world.
- understands some of the key concepts and principles of science.
- has a capacity for scientific ways of thinking.
- is aware of some of the important ways in which mathematics, technology, and science depend upon one another.
- knows that science, mathematics, and technology are human enterprises, and what that implies about their strengths and limitations.
- is able to use scientific knowledge and ways of thinking for personal and social purposes.

### Benchmarks for Science Literacy

In 1989 Project 2061 formed partnerships with six school-district teams that represented a cross-section of America's diverse public school sys-



**"This pioneering effort has profound implications for the future of our nation and, indeed, of the world."**

David A. Hamburg  
President (1979-1997),  
Carnegie Corporation of  
New York



tem. The teams, located in school-district centers in San Antonio, San Francisco, San Diego, Philadelphia, rural Georgia, and suburban McFarland, Wisconsin, were charged with designing curriculum models that would address the science literacy goals in *Science for All Americans*. As this work progressed, the teams

soon realized that an essential, prior, and difficult task was to formulate learning goals for specific grade levels along the way to science literacy. Their work, supplemented with input by consultants and Project 2061

staff and additional education research on student learning, was published in *Benchmarks for Science Literacy* in 1993.

### ***Benchmarks Defined***

*Benchmarks for Science Literacy* translates the science literacy goals in *Science for All Americans* into learning goals or benchmarks for grades K-2, 3-5, 6-8, and 9-12. It is available in print form, on computer disk (Windows and Macintosh) and on-line at <http://project2061.aaas.org>.

- *Benchmarks* does not advocate any particular curriculum design. It is a tool to be used by educators in designing a curriculum that makes sense to them and meets the science literacy goals outlined in *Science for All Americans*.
- *Benchmarks* describes levels of understanding and ability that all students are expected to reach on the way to becoming science literate. Though this is not the case today, most students should be able to learn well beyond the benchmarks.
- *Benchmarks* concentrates on the common core of learning that contributes to the science literacy of all students, regardless of gender, socio-economic status, or ethnic background.
- *Benchmarks* avoids technical language for its own sake.

- *Benchmarks* is informed by research on students' understanding and learning, which bears significantly on the selection and grade placement of the benchmarks.

*Benchmarks* is a companion tool to be used with *Science for All Americans*, not a substitute for it. *Science for All Americans* emphasizes cogency and connectedness and *Benchmarks* emphasizes analysis of the *Science for All Americans* story into components and their sequence. Both works include specific recommendations in the following areas:

**The Nature of Science** focuses on three principal subjects: the scientific world view, scientific methods of inquiry, and the nature of the scientific enterprise.

**The Nature of Mathematics** describes the creative processes involved in both theoretical and applied mathematics.

**The Nature of Technology** considers how technology extends our abilities to change the world and the considerations necessary for its prudent use.

**The Physical Setting** describes basic knowledge about the content and structure of the universe (on astronomical, terrestrial, and sub-microscopic levels) and the physical principles on which the universe seems to run.

**The Living Environment** delineates basic ideas about how living things function and how they interact with one another and their environment.

**The Human Organism** characterizes living systems through a focus on the human species as one that is in some ways like other living things and in some ways unique.

**Human Society** considers scientific principles of individual and group behavior, social organization, and the process of social change.

**The Designed World** reviews principles of how the world can be shaped and controlled in some key areas of technology.

**"This publication is another milestone in the longstanding effort of Project 2061 to improve the teaching and learning of science for all Americans."**

Bruce Alberts  
President, National  
Academy of Sciences



The Mathematical World gives an account of basic mathematical ideas that together play a key role in almost all human endeavors.

Historical Perspectives illustrates the science enterprise with 10 historical examples of exceptional significance in the development of science.

Common Themes presents general concepts that cut across science, mathematics, and technology.

Habits of Mind sketches the attitudes, skills, and ways of thinking that are essential to science literacy.

### Leading the Way in Education Reform

With nearly 133,000 copies of *Science for All Americans* and 97,000 copies of *Benchmarks* sold in the United States and throughout the world, Project 2061 has had a major influence on the standards movement and science education reform in America. A large-scale study released in 1996 by the Organisation of Economic Cooperation and Development (OECD) on innovations in science education around the world stated that Project 2061 was the "single most visible attempt at science education reform in American history." SRI International, in a year-long evaluation of the influence of *Science for All Americans* and *Benchmarks for Science Literacy*, stated that Project 2061 has "changed the national climate for science education reform."

#### State, National, and Worldwide Influence

The National Research Council drew heavily on *Science for All Americans* and *Benchmarks for Science Literacy* when writing the content standards in its *National Science Education Standards* (NSES) released in 1996 and acknowledges Project 2061 in the NSES introduction:

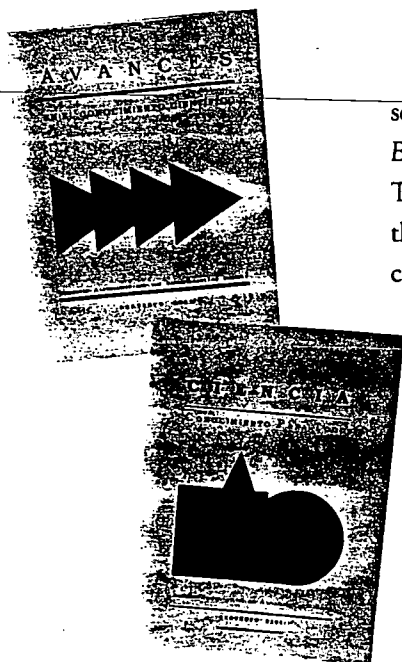
*The many individuals who developed the content standards sections of the National Science Education Standards made independent use and*

*The 1983 report A Nation at Risk: The Imperative for Educational Reform, released by the National Commission on Excellence in Education, warned of a national education crisis in America and urged reform of the entire system. Dozens of subsequent reports supported the Commission's conclusions and also linked the decline of the United States as an economic and technological world leader to the failing education system. Consistently poor scores of American students on such achievement tests as the National Assessment of Educational Progress (NAEP) and the Third International Mathematics and Science Study (TIMSS) have been further cause for alarm. Since 1985, Project 2061 has been working to address this education crisis by designing tools for educators to use to develop their own local curriculum keyed to national learning goals. Project 2061's work in developing such tools has been guided by the following principles of reform:*

- *The first priority of science education is basic science literacy for all students, including those in groups that have traditionally been served poorly by science education, so that as adults they can participate fully in a world that is increasingly being shaped by science and technology.*
- *Education for universal science literacy will, in addition to enriching everyone's life, create a larger and more diverse pool of students who are able to pursue further education in scientific fields and are motivated to do so.*
- *Science literacy consists of knowledge of certain important scientific facts, concepts, theories, and applications; the exercise of scientific habits of mind; and an understanding of the nature of science, its connections to mathematics and technology, its impact on individuals, and its role in society.*
- *For students to have the time needed to acquire essential knowledge and skills of science literacy, the sheer amount of material that today's science curriculum tries to cover must be significantly reduced.*
- *Effective education for science literacy requires that every student be frequently and actively involved in exploring nature in ways that resemble how scientists themselves go about their work.*

*interpretation of the statements of what all students should know and be able to do that are published in Science for All Americans and Benchmarks for Science Literacy. The National Research Council of the National Academy of Sciences gratefully acknowledges its indebtedness to the seminal work by the American Association for the Advancement of Science's Project 2061 and believes that use of Benchmarks for Science Literacy by state framework committees, school and school-district curriculum committees, and developers of instructional and assessment materials complies fully with the spirit of the content standards (National Research Council, 1996).*





Project 2061 has prepared a detailed comparison of the content portion of the *NSES with Benchmarks* and has found substantial overlap. The National Research Council has stated that the two documents share about 90% of the same content recommendations. This similarity testifies to a strong consensus among experts on what students should know and be able to do in science. Because Project 2061's learning goals encompass science, social science, mathematics, and technology, there is also considerable congruity between *Benchmarks for Science Literacy* and two other sets of national standards: *Curriculum and Evaluation Standards for School Mathematics* (National

Council of Teachers of Mathematics, 1989) and *Curriculum Standards for Social Studies* (National Council for Social Studies, 1994). A detailed comparison of *Benchmarks* to all three national standards documents can be found on Project 2061's CD-ROM tool *Resources for Science Literacy: Professional Development*.

A survey conducted by SRI International of 43 state curriculum documents revealed that many of them cite Project 2061 and

its publications as key sources in their bibliographies, quote directly from Project 2061 publications to describe their vision of science literacy or rationale for reform, or organize their own recommendations according to topics in *Science for All Americans* and *Benchmarks*. Some, like Indiana, even adopt Project 2061 benchmarks verbatim.

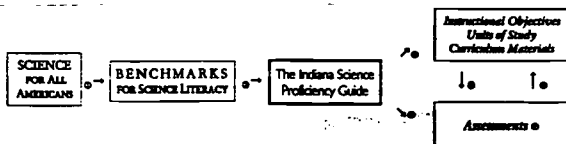
On the international front, *Science for All Americans* and *Benchmarks for Science Literacy* have been translated into Spanish, and Project 2061 is exploring the possibility of Japanese and Chinese translations. Countries around the world have sponsored conferences on these works including France, Spain, Taiwan, and Hong Kong.

## Project 2061 Influences the States

In a recent study of state science standards, the Thomas B. Fordham Foundation gave its highest rating to Indiana, a state which used *Benchmarks for Science Literacy* verbatim as its science standards. The Indiana Science Proficiency Guide highlights the state's indebtedness to Project 2061 in its introduction: "Without *Benchmarks*, the proficiencies, as found in this book, would not exist."

Dr. Suellen Reed, Indiana's Superintendent of Public Instruction stated, "By selecting *Benchmarks for Science Literacy* as the foundation for our guide, the committee that created our proficiencies ensured that we would have world class standards in science."

Of the six A-rated states in the Fordham study, five of them—Arizona, California, Indiana, New Jersey, and Rhode Island—have recognized Project 2061 as a major influence on their science standards.



The Indiana Science Proficiency Guide, 1997

## LOOKING AHEAD...

Updated and revised editions of *Science for All Americans* and *Benchmarks for Science Literacy*. Nearly a decade of progress in science, mathematics, and technology requires a new look at science literacy. Moreover, intensive examination of these documents in building curriculum frameworks and evaluating instructional materials has revealed the need for some refinement of benchmark connections, meaning, and grade placement. Revised editions of these volumes will incorporate advances in what is known about effective teaching and learning and will synthesize the best of national and state standards and benchmarks.

# PREPARATION AND SUPPORT FOR TEACHERS

**P**ROJECT 2061 GAVE ITS FIRST PROFESSIONAL DEVELOPMENT WORKSHOP FOR TEACHERS IN JUNE 1994. WORKSHOP MODULES WERE FURTHER DEVELOPED AND TESTED BY PROJECT 2061 STAFF, CONSULTANTS, AND SCHOOL-DISTRICT TEAM LEADERS, AND SOON PROJECT 2061 WAS FILLING OVER 150 WORKSHOP REQUESTS EACH YEAR. NOW, WITH A THREE-YEAR, \$2 MILLION START-UP GRANT FROM THE PEW CHARITABLE TRUSTS, PROJECT 2061 HAS LAUNCHED A NEW STAFF DEVELOPMENT ENTERPRISE.

## Project 2061 Professional Development Programs

Rather than take a "one size fits all" approach, Project 2061 Professional Development Programs are custom-tailored to meet the needs of individual school districts and schools. The enterprise will eventually become self-sustaining, allowing Project 2061 to be more actively engaged with teachers, administrators, school board members, curriculum materials developers, parents, and community members who want to help students achieve literacy in science, mathematics, and technology. School districts can utilize training funds already available from federal, state, and local sources, and Project 2061 will help districts find additional funding from corporate and other community sources so that staff development can be ongoing.

Participants in the workshops will achieve the following: 1) Understand what benchmarks and standards expect students to know and be able to do in science, mathematics, and technology, 2) Design more coherent curricula and select

more effective learning materials, 3) Teach with more purpose and skill, 4) Learn more about the subjects they teach, and 5) Connect with others who are involved in education reform.

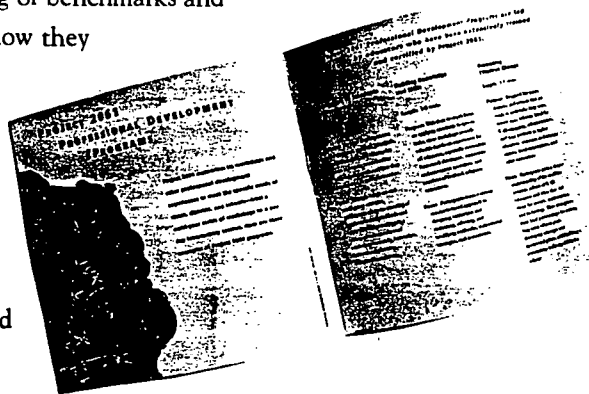
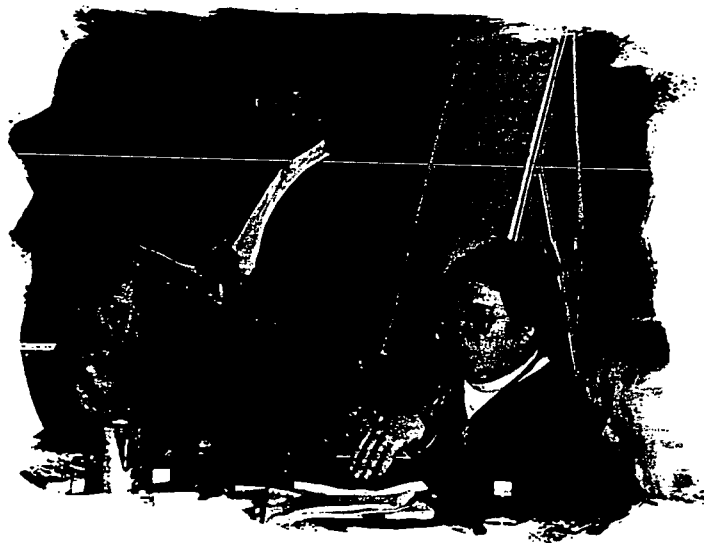
Teachers will work with Project 2061's print and electronic tools, with other state and national standards documents, and with actual curriculum materials and classroom resources. Workshops fall into three categories:

- **Introducing standards and benchmarks.**

These one- to three-day workshops introduce educators to standards-based reform and what it means for classroom practice. Through hands-on and small-group activities, participants study the meaning of benchmarks and standards and explore how they can be used to improve instruction, analyze state or district standards, and select curriculum materials aligned with standards.

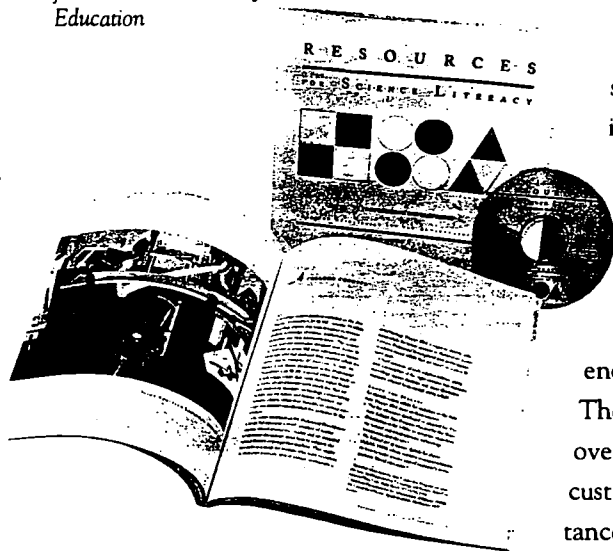
- **Building knowledge and skills.**

These one- to three-week workshops give participants a deeper understanding of what and how to teach to meet standards. Participants learn and practice new techniques for evaluating curriculum materials, instructional strategies, and assessment instruments for their alignment to content stan-



**"Resources is very user-friendly."**

Teachers Clearinghouse  
for Science and Society  
Education



dards and effectiveness criteria. Participants examine cognitive research, consider its applications to classroom practice, and reflect on the need for taking an evidence-based approach to any evaluation task.

- **Promoting long-term partnerships.** Some states and districts are ready to undertake more system-wide reforms involving partnerships with higher education institutions, parent and community organizations, corporations, museums and science centers, and so on. These workshops scheduled over a period of years provide customized technical assistance, leadership training, and consulting services over time. They help districts and schools take the first steps toward purposefully redesigning their entire K-12 curriculum around standards and strengthening their partnerships by setting long-term reform goals, developing strategic and operational plans, and building a community-wide capacity for reform.

## Resources for Science Literacy: Professional Development

In 1997 Project 2061 released *Resources for Science Literacy: Professional Development*, a CD-ROM tool that enables teachers, higher education faculty, and school district curriculum and professional development specialists to make more effective use of specific learning goals like benchmarks and national and state standards. This CD-ROM, used in many of Project 2061's workshops, offers an array of resources including the full text of *Science for All Americans*. A companion print volume introduces users to the CD-ROM, which includes the following:

- **Science Trade Books** cites over 120 books for a general audience on many areas of science, technology, and mathematics. Each entry includes full bibliographic information, reviews, and other descriptive data. Users can search the database by topics found in *Science for All Americans* to compile customized reading lists.
- **College Courses** describes 15 college courses offered at ten colleges and universities that provide examples and guidelines for designing courses around concepts from *Science for All Americans*.
- **Comparisons of Benchmarks to National Standards** shows how Project 2061's benchmarks relate to national content standards in science, mathematics, and social studies. Educators can use this component to compare their own state or district level guidelines to the national content recommendations.
- **Cognitive Research** introduces users to research literature that will familiarize them with some of the difficulties students may have in learning many of the topics in *Science for All Americans* and *Benchmarks*. In addition to *Benchmarks'* chapter 15, "The Research Base," and its bibliography of over 300 references, there are descriptions of more than

### Philadelphia Benefits from Long-Term Training

Through long-term collaboration, Project 2061 helps school districts build their capacity for systemic reform. For three years, K-12 teachers and administrators in Philadelphia met with Project 2061 staff for up to a month every summer and once a week during the school year. Collaboration continued as these educators joined with Project 2061 in providing workshops to other Philadelphia teachers. Their efforts paid off. In its 1997 report on the city's reform efforts, the Philadelphia Education Fund described the significant impact of Project 2061's professional development: "...the 2061 teachers brought important perspectives and expertise to the District's efforts: knowledge that standards creation can be frustrating and takes time; experience in articulating work across all grade levels; skill in analyzing textbooks and materials to see if they are standards-driven; experience with constructivist teaching methods; and a commitment to addressing diversity."

100 articles, reports, and videos related to how students learn science literacy concepts at various ages.

- **Project 2061 Workshop Guide** includes a rich collection of materials that can be used to design and conduct a variety of workshops to help participants understand science literacy goals and to use them to improve curriculum, instruction, and assessment.

The *Resources for Science Literacy: Professional Development* CD-ROM is currently being updated so it can be connected to the Internet. This new Web-CD will provide the benefits of a stand-alone electronic tool with search and zoom capabilities as well as pointers to timely and relevant information on the World Wide Web.

## New Models for Teacher Preparation

With funding from the John D. and Catherine T. MacArthur Foundation, Project 2061 is working closely with university/school-district collaboratives in Maryland and Colorado to help them develop model programs for preparing K-12 teachers and supporting them during their first years in the classroom. The Maryland team involves education faculty from Towson University, teachers and administrators from the Baltimore County School District, and several state policy makers. In Colorado, teams are made up of representatives from six universities along with master science teachers from partner schools throughout the state. Over the next two years, the teams at both sites will be developing new college science courses around ideas from *Science for All Americans*, incorporating the study of *Benchmarks for Science Literacy* into teaching-methods courses, and supporting the professional development of a cadre of experienced K-12 teachers to serve as mentors to new teachers.

## Preparing Future Science Education Leaders

NASA has provided funding to Project 2061 to plan a program that will proactively develop science education leaders who can advance the ideas and processes of standards-based reform for all students. The program, open to graduate students, faculty, and administrators, will be run jointly by AAAS's Project 2061 and its Directorate for Education and Human Resources. Science education reform leaders from across the country are joining with Project 2061 to outline components of the program, which will include research, mentoring, networking, and developing expertise through fieldwork in schools and communities.

### Project 2061 Workshops Create Leaders in the Classroom

*Sue Harsin's attendance at a week-long workshop on Project 2061 tools enabled her to go back to her Banks School District in Oregon and take on the role of a "leader in science." In presentations to elementary, junior high, and high school science teachers, she keeps her colleagues up to date on Project 2061's tools. As chairman of her district's science committee, Harsin is guiding the development of a new science curriculum. She described how Project 2061 has also changed her work in the classroom: "The workshop last summer opened my eyes to really looking at each science activity that I do. I think about the age appropriateness of each lesson by referring to Benchmarks for Science Literacy and using our state benchmarks and our district curriculum. I appreciate the research behind Benchmarks, which makes me feel confident that what I'm teaching in science is what my second- and third-graders can understand and retain. The resources I choose to use are geared to the grades I am teaching, and I am confident that I am more effective as a science teacher than I was in past years."*

## LOOKING AHEAD...

**Updated version of *Resources for Science Literacy: Professional Development*:** A revised version of the CD-ROM scheduled for release in the year 2000 will include extended databases and new workshops and college courses developed through Project 2061's work with teacher educators in Maryland and Colorado.

# TEXTBOOK AND TEST ALIGNMENT

**F**OR THE PAST THREE YEARS, WITH FUNDING FROM THE NATIONAL SCIENCE

FOUNDATION AND INPUT FROM MORE THAN ONE HUNDRED K-12 TEACHERS, TEACHER

EDUCATORS, MATERIALS DEVELOPERS, AND COGNITIVE SCIENTISTS NATIONWIDE, PROJECT 2061 HAS DEVELOPED AND FIELD-TESTED A RIGOROUS PROCEDURE FOR ANALYZING SCIENCE AND MATHEMATICS CURRICULUM MATERI-

ALS. NUMEROUS EDUCA-

TORS HAVE BEEN TRAINED TO USE THIS PROCEDURE, WHICH ANALYZES NOT ONLY A TEXTBOOK'S CONTENT BUT ALSO ITS INSTRUCTIONAL STRATEGIES TO SEE WHETHER THE STRATEGIES WILL ACTUALLY HELP STUDENTS TO UNDERSTAND THE SPECIFIC IDEAS IN BENCHMARKS AND STANDARDS.

THE PROJECT 2061  
CURRICULUM-ANALYSIS PROCEDURE



## Project 2061's Curriculum Materials Analysis Procedure

The procedure requires four critical steps:

**Review the Material.** A preliminary inspection of the material determines whether it merits further analysis. If so, specific learning goals or benchmarks are identified to be the focus of the analysis.

**Analyze Content.** Examine the material's content in detail for its alignment to the specified learning goals. If this step reveals a match, the analysis continues.

**Evaluate Instructional Strategy.** Using criteria derived from research on student learning and on characteristics of effective teaching, estimate how well a material's instructional strategies support student learning of the ideas and skills for which there is a content match.

**Summarize Findings.** Describe and summarize evidence showing how well the material's content and its instructional strategies relate to the learning goals and draw conclusions on the material's strengths and weaknesses.

Project 2061's procedure has gained wide endorsement in the education community. The U.S. Office of Education Research and Improvement (OERI) invited Project 2061 to explain its analysis procedure in the resource kit, *Attaining Excellence: TIMSS as a Starting Point to Examine U.S. Curricula*, which was distributed by the Department of Education to school districts around the country. OERI's Expert Panel for Mathematics and Science Literacy used Project 2061's procedure and advice when developing its own curriculum analysis procedure for identifying promising and exemplary K-12 programs. The National Research Council has invited Project 2061's curriculum director to serve on a committee that will recommend criteria and procedures for selecting instructional materials that align



with standards. Additionally, NASA has provided funding to Project 2061 to train Goddard Space Flight Center managers and curriculum developers/reviewers who are involved in K-12 educational outreach to use Project 2061's procedure. This training will lead to ongoing review of NASA curriculum support materials for their alignment with benchmarks and standards.

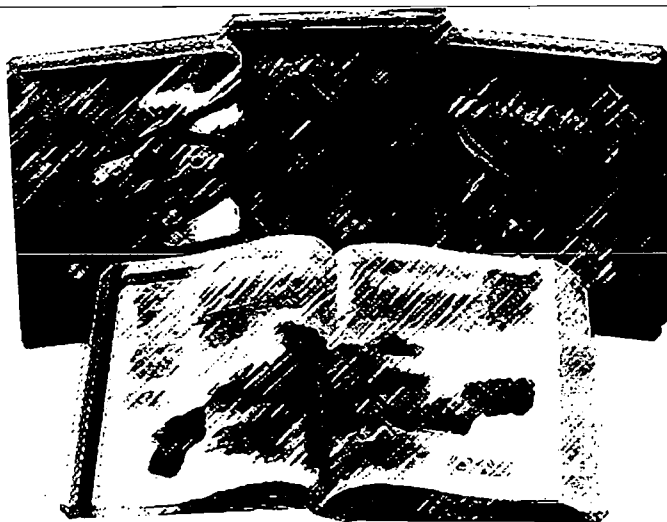
## Resources for Science Literacy: Curriculum Materials Evaluation

The forthcoming book and CD-ROM, *Resources for Science Literacy: Curriculum Materials Evaluation*, will contain a detailed description of Project 2061's curriculum materials evaluation procedure and its uses, along with the rationale and an overview of the research supporting this analytical approach. It will also contain:

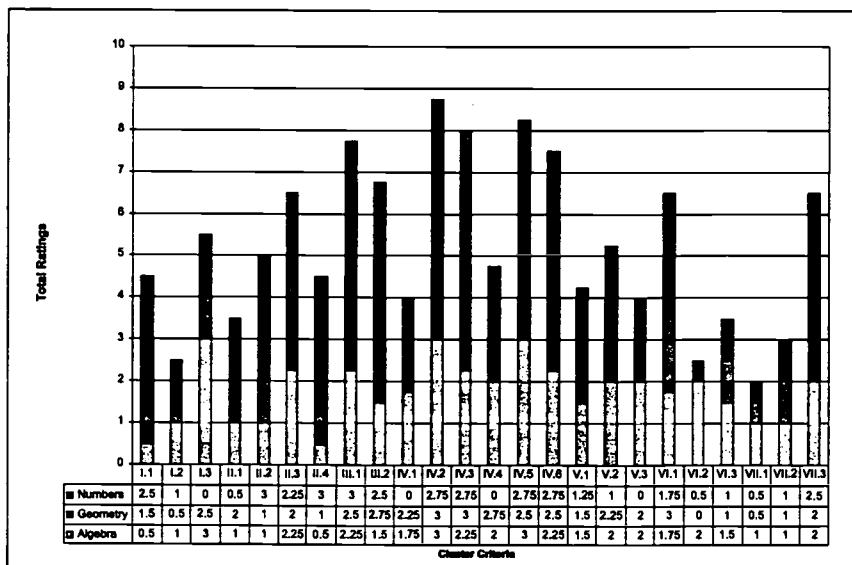
- Explanations of criteria for evaluating materials and examples, both positive and negative, illustrating how to apply the criteria to a variety of K-12 science and mathematics curriculum materials.
- Commentary on important issues related to curriculum evaluation in general and Project 2061's analysis procedure in particular.
- A summary of cognitive research—including and supplementing that in *Benchmarks*—relevant to teaching and learning specific ideas and skills.
- A small collection of evaluated materials, including bibliographic information, summaries of activities, descriptions of each material's intended audience and goals, evaluation reports, and samples from the instructional materials themselves.
- Tutorials and workshop plans for applying the procedure in different settings for a variety of purposes.

## Curriculum Materials Evaluation Database

The rigor of Project 2061's curriculum analysis procedure makes it reliable from one reviewer to the next but too time-consuming to be widely practical for the average



school or district to use. Nevertheless, anyone with responsibility for evaluating or selecting curriculum materials will want to take advantage of the critical information the procedure yields. With funding from the Carnegie Corporation of New York, Project 2061 is training independent teams of educators, scientists, and mathematicians to analyze curriculum materials and prepare detailed reports that will be available in print



Analysis data on mathematics textbooks.

BEST COPY AVAILABLE

and on-line. Project 2061's Curriculum Materials Evaluation Database will offer teachers objective, credible, and easy-to-use information about how well textbooks can support students learning benchmarks and standards. The teams are analyzing both newly developed and widely used middle-school science and mathematics textbooks and, when additional funding is received, will progress to elementary and high school curriculum materials.

## Influencing Textbook Development

From the beginning, Project 2061 envisioned that its curriculum materials analysis procedure would increase both the demand for materials

that could help students achieve benchmarks and standards and the supply of such materials. Project 2061's workshops with not-for-profit curriculum developers have stimulated interest in tying instructional materials more closely to benchmarks and

standards, and some commercial publishers have begun to incorporate Project 2061's benchmarks into their print and electronic products.

It may be that Project 2061's procedure will be more useful in designing new materials than in revising existing texts. Several curriculum materials developers have asked Project 2061 to support their grant proposals by agreeing to provide training in the procedure to author teams and to review early drafts.

## LOOKING AHEAD . . .

### *Resources for Science and Mathematics*

**Literacy: Assessment** High-stakes tests have become a driving force for change in education, and it is imperative that they align well with national and state benchmarks and standards. Project 2061 is analyzing selected mathematics and science assessment tasks and exploring the development of a full-scale assessment analysis procedure, which would be taught in workshops, used to create an assessment database, and published in book and CD-ROM form.

### Project 2061 Helps Philadelphia School District Choose Texts

*Carolyn Minor, a science coordinator with Philadelphia's Urban Systemic Initiative, has attended numerous Project 2061 workshops and received extensive training in Project 2061's curriculum materials analysis procedure. This training has enabled her to assist Philadelphia's school district in analyzing current elementary textbooks to see if they match Philadelphia's standards (based on Benchmarks for Science Literacy). Minor stated, "These workshops have helped me to make better choices about curriculum resources. I'm learning how to look at materials with a more critical eye. Surprisingly, much of what is currently available does not help students to achieve the understandings that are expressed in the benchmarks. I'm learning how to fix these materials, and how to look for new ones."*



# K-12 CURRICULUM COHERENCE

SCIENCE EDUCATION REFORM GOES BEYOND INDIVIDUAL CLASSROOMS OR INDIVIDUAL GRADES. FOR STUDENTS TO ACHIEVE SCIENCE LITERACY, THE ENTIRE K-12 CURRICULUM MUST BE REFORMED. THIS IS A MAJOR UNDERTAKING WORTHY OF THOUGHTFUL DESIGN RATHER THAN PIECEMEAL DECISIONS. PROJECT 2061 HAS DEVELOPED A NEW PRINT AND CD-ROM TOOL, *DESIGNS FOR SCIENCE LITERACY*, TO BE PUBLISHED IN EARLY 1999, WHICH DEALS SPECIFICALLY WITH STRATEGIES AND TECHNIQUES FOR ALIGNING THE ENTIRE K-12 CURRICULUM TO BENCHMARKS AND STANDARDS OR STATE AND LOCAL FRAMEWORKS.



## Designs for Science Literacy

While upholding ambitious learning goals, *Designs* fosters the development of diverse curricula suited to the needs

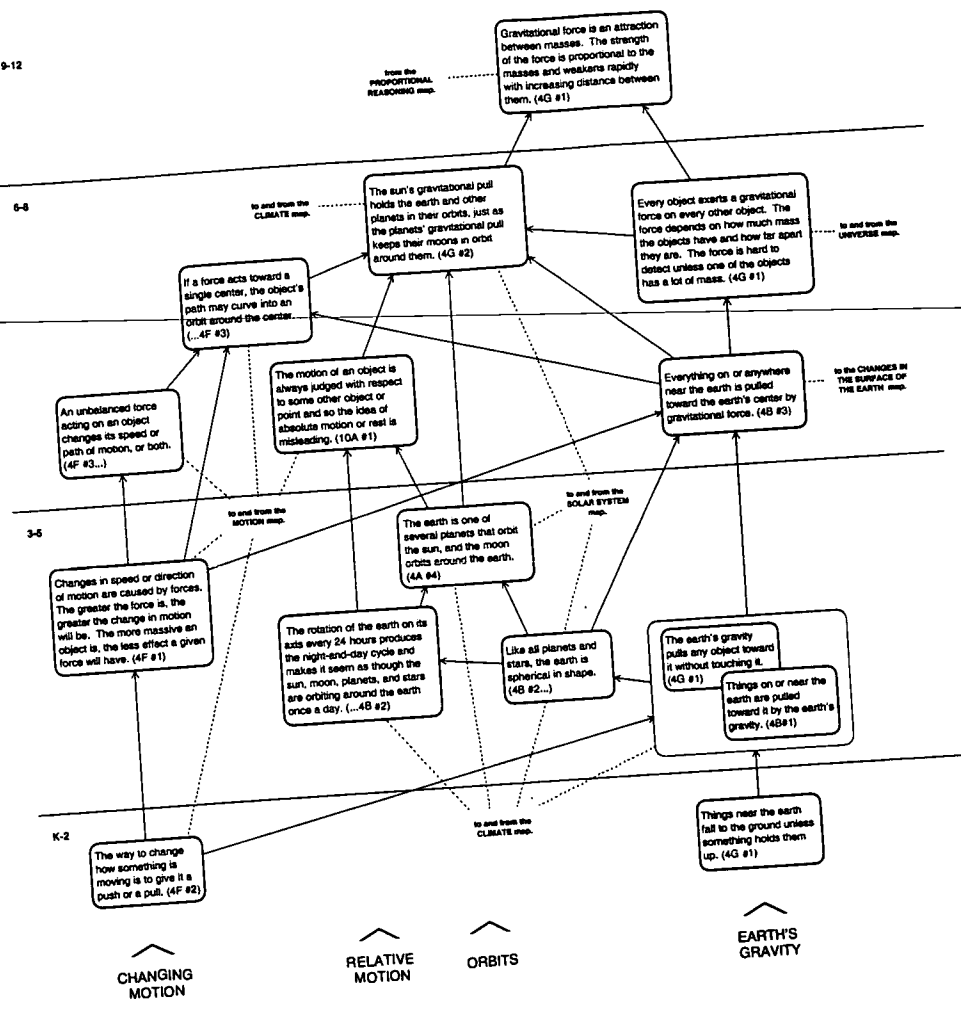
of individual schools, communities, and students by doing the following:

- Offering a conceptual framework—and a computer tool—that educators can use to apply general design principles to their work on the curriculum.
- Encouraging school systems to adopt a curriculum design process that centers on learning goals; engages as many stakeholders as possible; takes a systematic approach; and evaluates risks, benefits, and trade-offs.

- Helping curriculum designers to consider the science, mathematics, and technology components of the curriculum together and within the context of the K-12 curriculum.
- Describing how a curriculum might eventually be assembled from a pool of high-quality instructional blocks of various sizes from week-long units to year-long courses.
- Providing teacher educators with a resource for teaching the principles of curriculum analysis and design as an essential part of pre-service training.
- Enabling school districts to begin making changes in today's curriculum that will provide a foundation for the curriculum redesign of tomorrow. For example, *Designs*

## Project 2061 Helps Baltimore School Streamline Curriculum

Teachers and supervisors from Timonium Elementary School in Baltimore attended a five-day Project 2061 workshop to learn how to restructure their K-5 science curriculum. Participants learned how to design and develop lessons with particular benchmarks in mind and used Project 2061's reform principle "less is more" to focus on fewer topics and cover them in more depth. They used Benchmarks for Science Literacy and growth-of-understanding maps to see which learning goals were most important for students in grades K-5. Timonium Elementary School principal Kathy Volk commented, "Thinking about how learning occurs over time enabled us to eliminate topics that were too advanced or less relevant. While it took some time and effort to make the changes, our new streamlined curriculum is showing positive results. Our students now have more time to concentrate on key ideas and to learn them more thoroughly."



A growth-of-understanding map on gravity.

discusses how to build local professional capability, reduce the core content of the over-stuffed curriculum, and enhance connections across subjects and grades.

Atlas of Science Literacy

An entire K-12 curriculum planned with the relationships among benchmarks in mind will provide a better paced and more coherent progression of subjects and courses. To help educators gain insight into the sequence and connections among K-12 benchmark ideas, Project 2061 is developing the *Atlas of Science Literacy*, a col-

lection of conceptually linked maps that depict how students might grow in their understanding and skills toward particular science literacy goals. These maps display not only the sequence of benchmark ideas that lead to a literacy goal, but also the supporting connections across different areas of science, mathematics, and technology, and how ideas come together in more sophisticated understanding. The *Atlas* will give teachers a better sense of how their instruction fits into the larger picture of students' K-12 science education—where ideas are coming from and where they will lead next—and will provide the basis for discussions and collaboration among teachers at different grade levels and across subjects.

The *Atlas* will include approximately 50 maps depicting K-12 growth of understanding in a variety of science literacy topics including the water cycle, evolution and natural selection, structure of matter, and the flow of matter and energy in ecosystems. A Web-CD version will allow users to move conveniently between connected maps and will provide hypertext links that identify relevant research and other information.

LOOKING AHEAD. . .

**System 61.** This comprehensive software tool will incorporate, integrate, and update many of Project 2061's reform tools and supplement them with other valuable resources such as state and local standards and curriculum guidelines. To make Project 2061's tools as widely available as possible, System 61 will be accessible on CD-ROM and the World Wide Web.

# COMMUNITY-WIDE COMMITMENT

SERIOUS EFFORTS TO ACHIEVE LITERACY IN SCIENCE, MATHEMATICS, AND TECHNOLOGY

FOR ALL STUDENTS MUST BE BASED ON AN UNDERSTANDING OF HOW DIFFERENT MEMBERS OF THE COMMUNITY—TEACHERS, PARENTS, UNIVERSITY FACULTY, AND BUSINESS AND INDUSTRY LEADERS—WORK TOGETHER IN THE EDUCATION SYSTEM. A NEW PUBLICATION FROM PROJECT 2061 OFFERS A USEFUL STARTING POINT FOR THIS KIND OF SYSTEMIC REFORM.

## Blueprints for Reform

Project 2061's *Blueprints for Reform: Science, Mathematics, and Technology Education* presents summaries of reports written by teams of experts on 12 crucial areas of the K-12 education system that must work together and change to bring about education reform. The areas covered are equity, policy, finance, research, school organization, curriculum connections, materials and technology, assessment, teacher education, higher education, family and community, and business and industry. Written for teachers, parents, administrators, local leaders in business and government, and other community members, *Blueprints for Reform* provides an extensive guide to hundreds of related

education resources, programs, and organizations and offers a focused starting point for exploring systemic educational reform. Project 2061 has made the publication available on its Web site at <http://project2061.aaas.org> and strives to continue the dialogue about reform through on-line discussion groups and monthly surveys on *Blueprints* chapters and topics.

## Dialogue on Early Childhood Science, Mathematics, and Technology Education

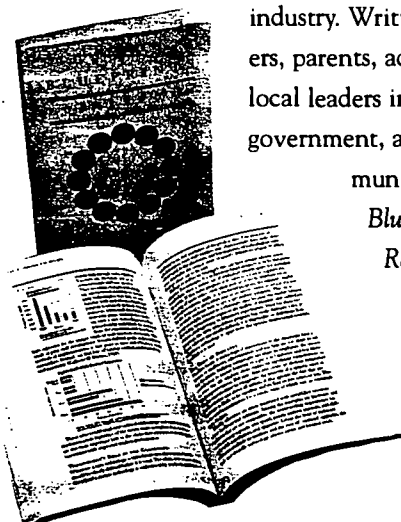
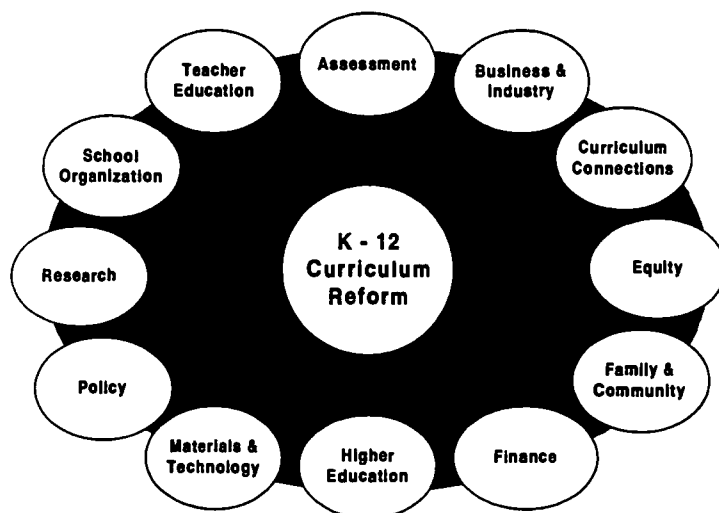
Project 2061, with funding from the National Science Foundation, sponsored the Forum on Early Childhood Education in Science, Mathematics, and Technology in February 1998.

One of the first meetings to seriously address the role of these

areas in early childhood education, the forum was

attended by more than 100 researchers, educators, and policymakers. Discussions centered on issues related to demographics,

policy, professional development, cognitive development, curriculum, instruction, assessment, equity, and the role of parents and the community. To build on the dialogue started at the forum, Project 2061 is publishing a set of commissioned papers in book form and on-line at <http://project2061.aaas.org>.



## National Council on Science and Technology Education

Throughout its 13 years, Project 2061 has been advised by the National Council on Science and Technology Education, an advisory board whose members are drawn from the scientific, educational, and business communities. The original Council guided the scientific panels and Project 2061 staff through the publication of *Science for All Americans*. As the Project entered its next phase and began to work more closely with school-district educators, the Council was reconfigured to include more teachers and school administrators. Today, the Council is made up of members of the scientific, higher education, K-12, and business communities who provide expert advice and assistance on Project 2061 activities throughout the year.

## National Council on Science and Technology Education

DONALD LANGENBERG  
Chair  
Chancellor  
University of Maryland Systems

RAUL ALVARADO, JR.  
Supplier Diversity Programs  
International Space Station  
The Boeing Company

DIANA AZCOITIA  
Principal  
Kelwyn Park High School  
Chicago, IL

SUSAN CAREY  
Professor  
Department of Psychology  
New York University

JOAN DUEA  
Professor of Education  
University of Northern Iowa

BERNARD FARGES  
Center Director  
San Francisco Project 2061

STUART FELDMAN  
Dept. Group Manager  
Internet Applications & Services  
Thomas J. Watson Research  
Center, IBM

LINDA FROSCHAUER  
Science Dept. Chair Person  
Weston Middle School  
Weston, CT

PATSY D. GARRIOTT  
Education Initiatives  
Representative  
Eastman Chemical Company

FRED JOHNSON  
Assistant Superintendent for  
Instruction  
Shelby County Board of  
Education  
Memphis, TN

ROBERTS T. JONES  
President and Chief Executive  
Officer  
National Alliance of Business

SUE MATTHEWS  
Science Teacher  
Elberton County Middle School  
Elberton, GA

GARY A. NAKAGIRI  
Curriculum Coordinator for  
Mathematics and Science  
San Mateo County Office  
of Education  
Redwood City, CA

ROBERT SCIDMORE  
Technology Staff Development  
Specialist  
Eau Claire School District  
Eau Claire, WI

BENJAMIN SHEN  
Reese Flower Professor Emeritus  
of Astrophysics  
University of Pennsylvania

CLAIBOURNE D. SMITH  
Vice President, Technical-  
Professional Development  
DuPont Company

SAMUEL WARD  
Professor & Dept. Head  
Molecular and Cellular Biology  
University of Arizona

TERRY WYATT  
Science Teacher  
Toledo Public Schools  
Toledo, OH

JOHN ZOLA  
Social Sciences Teacher  
The New Vista High School  
Boulder, CO

### Ex-Officio Members

MARCIA C. LINN  
Professor and Academic  
Coordinator  
Mathematics, Science and  
Technology Education  
University of California,  
Berkeley

GEORGE NELSON  
Director, Project 2061  
American Association for the  
Advancement of Science

## Project 2061 School-District Centers

Established in 1989 and located in school-district centers in San Antonio, San Francisco, San Diego, Philadelphia, rural Georgia, and suburban McFarland, Wisconsin, Project 2061's six school-district teams represent America's diverse public school system. These teams played a major role in the development of *Benchmarks for Science Literacy* and Project 2061's professional development workshops. Today, the teams set their own agendas for local reform and provide numerous workshops in their com-

munities on Project 2061's reform tools. Their input and feedback ensure that Project 2061 activities are always grounded in the front-line experience of teaching and influenced by the diversity of our nation's schools.

### Project 2061 School-District Centers

GEORGIA  
Sue Matthews, Center Director  
(706) 283-1110  
smatthew@moe.coe.uga.edu

WISCONSIN  
Leroy Lee, Center Director  
(608) 263-1692  
lrlee@facstaff.wisc.edu

PHILADELPHIA, PA  
Natalie Hiller, Center Director  
(215) 299-7191  
nhiller@phila.k12.pa.us

SAN ANTONIO, TX  
Joan Drennan-Taylor, Center Director  
(210) 208-8133  
jdtaylor@accd.edu

SAN DIEGO, CA  
Danine Ezell, Center Director  
(619) 479-7111, ext. 255  
dezell@sdcoe.k12.ca.us

SAN FRANCISCO, CA  
Bernard Farges, Center Director  
(415) 759-2767  
bfarges@sfusd.k12.ca.us

## Informal Science Programs

Museums and science centers around the country have used Project 2061's tools to develop new exhibits and teacher kits.

- Investigate!, a hands-on exhibit at the Boston Museum of Science, promotes some of the scientific thinking skills described in *Science for All Americans*. Visitors step into the role of scientist and ask questions, take measurements, and interpret results of their experiments.
- Science Alive!, an interactive science center in Grand Rapids, Michigan, focuses its exhibits on four *Benchmarks* chapters: The Living Environment, The Human Organism, The Physical Setting, and The Designed World.
- The Cranbrook Institute of Science in Bloomfield Hills, Michigan, has based its new exhibits on a concept similar to Project 2061's growth-of-understanding maps, emphasizing connections among key systems such as climate, plate tectonics, and evolution.
- The Franklin Institute Science Museum in Philadelphia has revised its "Museum to Go" teacher kits using *Benchmarks for Science Literacy* to ensure that concepts are introduced at appropriate grade levels.

Project 2061's work has also guided the producers of such television programs as *Scientific American Frontiers* and *The New Explorers*, which have been seen in households across America.

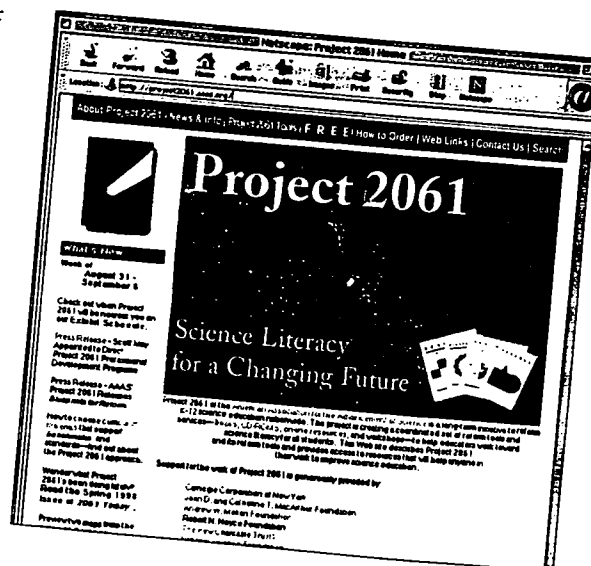


## LOOKING AHEAD...

**Reaching the Community.** To help all Americans understand the need for long-term education reform in science, mathematics, and technology, Project 2061 is expanding its communications efforts. Through television, radio, video, newspaper and magazine articles, education conferences, and the World Wide Web, Project 2061 will seek to build support for science literacy among all members of the community.

## Project 2061 Influences Community Collaboration in Oregon

Oregon elementary teacher Frank Luzaich was introduced to Project 2061 tools and resources during a two-week staff development workshop last summer. He subsequently helped his school district to develop a science curriculum framework based on *Benchmarks for Science Literacy* and Oregon's state standards. When he realized that his elementary school lacked the texts and equipment needed to teach toward benchmarks, he rallied for funding and unknowingly convinced a parent during his presentation. The parent donated half the funds for a new, full K-6 curriculum for two elementary schools. Luzaich stated, "Unlike most large curriculum projects, we have been rewarded with immediate satisfaction. Elementary teachers have a new curriculum framework and new curriculum materials this year. The Project 2061 training I received produced more than a binder on the shelf. We now have science equipment and instructional materials that align well with benchmarks."



BEST COPY AVAILABLE

61

20



# IMAGINE A NATION WHOSE CITIZENS ARE SCIENCE LITERATE

**T**HERE ARE NO VALID REASONS—  
INTELLECTUAL, SOCIAL, OR  
ECONOMIC—WHY THE UNITED STATES  
CANNOT TRANSFORM ITS SCHOOLS TO  
MAKE SCIENCE LITERACY POSSIBLE  
FOR ALL STUDENTS. WHAT IS REQUIRED  
IS NATIONAL COMMITMENT, DETERMINATION,  
AND A WILLINGNESS TO WORK TOGETHER  
TOWARD COMMON GOALS.

*Science for All Americans*

As the accomplishments and new initiatives described indicate, Project 2061's approach to science education reform is both visionary and practical. While keeping its long-term goals clearly in focus, the project aims to improve science, mathematics, and technology education in immediate, tangible ways—by helping teachers make better decisions about how and what they teach, encouraging curriculum developers to shape new textbooks around benchmarks, or showing parents how they can expand on their children's school experiences with books, museum visits, or simply a walk in the neighborhood. Much has been accomplished over the past 13 years but much remains to be done.

Significant, lasting reform will require more resources—both financial and human—more time, and, above all, more patience. But the cost of not making such investments is high. As *Science for All Americans* reminded reformers in

1989, the wisdom with which people use

science and technology will, to a large extent, determine the fate of individual human beings, the nation, and the world. With its strong commitment to achieving a science-literate society, AAAS's

Project 2061 will continue to work toward its goals and improve science, mathematics, and technology education for all students.



# PROJECT 2061 STAFF

George Nelson  
Director

Andrew Ahlgren  
Associate Director

Ayda Argueta  
Administrative Support Specialist  
Project 2061 Professional Development  
Programs

Mary Ann Bearton  
Professional Development Manager  
Project 2061 Professional Development  
Programs

Lucia Buie  
Administrative Support Specialist

Fernando Cajas  
Research Associate

Ann Caldwell  
Research Associate

Sherelle Derico  
Financial Analyst

Mark Finn  
Technology Specialist

Barbara Goldstein  
Administrative Support Specialist

Laura Grier  
Project Coordinator

Terry Handy  
Project Coordinator

John Howe  
Marketing Manager  
Project 2061 Professional Development  
Programs

Sophia Kesidou  
Senior Research Associate

Samuel Kim  
Webmaster

Mary Koppal  
Communications Director

Gerald Kulm  
Program Director

Lester Matlock  
Administration Director

Scott May  
Executive Director

Project 2061 Professional Development  
Programs

Francis Molina  
Electronic Resources Manager

Kathleen Morris  
Senior Program Associate

Keran Noel-Tarpley  
Publications Assistant

Jo Ellen Roseman  
Curriculum Director

Susan Shuttleworth  
Assistant Editor

Luli Stern  
Research Associate

Alan Stonebraker  
Technology Specialist/Multi-Media

Soren Wheeler  
Project Coordinator

Cheryl Wilkins  
Administrative Support Specialist

## Sources

Atkin, J. Myron, Bianchini, Julie A., & Holthius, Nicole I. (1996). *The different worlds of Project 2061*. Paris: Organisation of Economic Cooperation and Development.

Indiana Department of Education. (1997). *The Indiana science proficiency guide*. Indianapolis: Indiana DOE Publications.

National Research Council. (1996). *National science education standards*. Washington, D.C.: National Academy Press.

Useem, Elizabeth, Culbertson, James, & Buchanan, Judy. (October 1997). *The contributions of teacher networks to Philadelphia's school reform*. Philadelphia, PA: Philadelphia Education Fund.

Zucker, Andrew A., Young, Viki M., & Luczak, John. (1996). *Evaluation of the American Association for the Advancement of Science's Project 2061*. Menlo Park, CA: SRI International.



# INFORMATION AND ORDERING

To order Spanish translations of *Science for All Americans* or *Benchmarks for Science Literacy*, or to subscribe to our semi-annual newsletter, 2061 Today, please contact:

Project 2061

American Association for the Advancement of Science

1333 H Street, NW

P.O. Box 34446

Washington, D.C. 20005

Telephone: 202-326-6666

Fax: 202-842-5196

E-mail: [project2061@aaas.org](mailto:project2061@aaas.org)

World Wide Web:

<http://project2061.aaas.org>

To find out more about Project 2061 Professional Development Programs please contact:

Project 2061 Professional Development Programs  
American Association for the Advancement of Science

1333 H Street, NW

P.O. Box 34446

Washington, D.C. 20005

Telephone: 1-888-PDP-2061  
or 202-326-6200

Fax: 202-842-5196

E-mail: [pdp2061@aaas.org](mailto:pdp2061@aaas.org)

World Wide Web:

<http://project2061.aaas.org>

*Science for All Americans*, *Benchmarks for Science Literacy*, *Resources for Science Literacy: Professional Development*, and *Blueprints for Reform* are published by Oxford University Press. They can be ordered by mail or telephone from:

Oxford University Press, Ordering Department

2001 Evans Road, Cary, NC 27513

Telephone: 1-800-451-7556

Oxford University Press U.S. Web Site: <http://www.oup-usa.org>

*Blueprints for Reform*, 0-19-512427-8, \$17.95, paper

*Science for All Americans*, 0-19-506771-1, \$13.95, paper

*Benchmarks for Science Literacy*, 0-19-508986-3, \$23.95, paper

*Benchmarks on Disk:*

for Windows, 0-19-509901-X, \$24.95

for Macintosh, 0-19-509402-6, \$24.95

*Resources for Science Literacy: Professional Development*

0-19-510873-6, \$49.95, CD-ROM

*Resources for Science Literacy: Professional Development & Benchmarks for Science Literacy*, 0-19-521345-9, \$70.00

*Benchmarks for Science Literacy & Science for All Americans*, 0-19-509110-8, \$32.50

*Benchmarks on Disk & Benchmarks for Science Literacy*

for Windows, 0-19-510329-7, \$35.00

for Macintosh, 0-19-509403-4, \$35.00

*Benchmarks on Disk, Benchmarks for Science Literacy, & Science for All Americans*

for Windows, 0-19-510328-9, \$45.00

for Macintosh, 0-19-509404-2, \$45.00

Project 2061 Panel Reports are available from:

AAAS Distribution Center

P.O. Box 521, Annapolis Junction, MD 20710

Telephone: 1-800-222-7809

(VISA/MasterCard only; 9 a.m.-4 p.m. EST)

Project 2061 Panel Reports: \$8.00 each (AAAS members \$6.50); 10-49 copies \$4.00 each; 50 or more copies \$3.50 each. Individuals must prepay. For institutional purchase orders, add \$3.50 for postage/handling. Please specify item number and allow 2-3 weeks for delivery. For CA, add applicable sales tax; for Canada, add 7% GST.

*Biological & Health Sciences* (#89-02S)

*Mathematics* (#89-03S)

*Physical & Information Sciences and Engineering* (#89-04S)

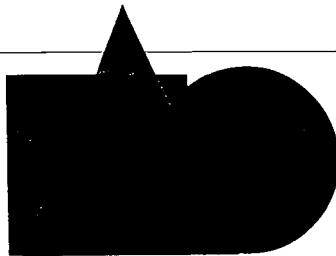
*Social & Behavioral Sciences* (#89-05S)

*Technology* (#89-06S)

*Five-volume set* (#89-12Y), \$35.00 (AAAS members \$30.00); 10-49 sets \$28.00 each; 50-99 sets \$25.50 each; 100 or more \$22.00 each.

# SCIENCE

FOR ALL AMERICANS

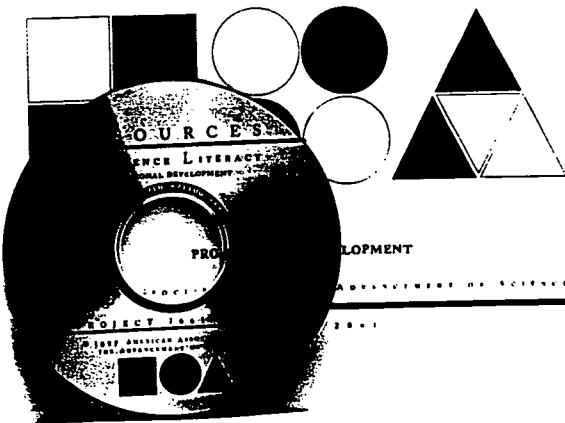


AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

PROJECT 1981

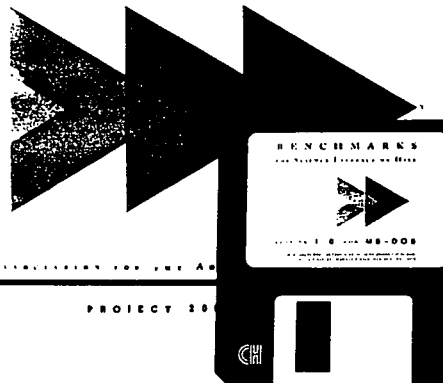
# RESOURCES

FOR SCIENCE LITERACY



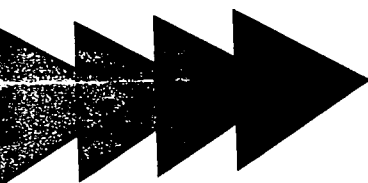
# BENCHMARKS

FOR SCIENCE LITERACY



# ADVANCES

IN EL CONOCIMIENTO CIENTÍFICO

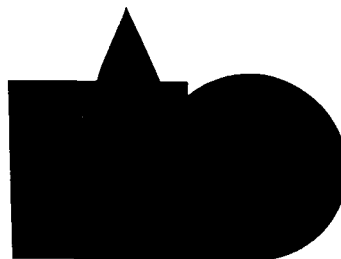


AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

PROYECTO 1981

# CIENCIA:

CONOCIMIENTO PARA TODOS



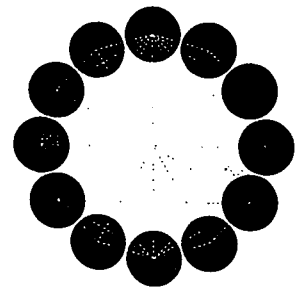
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

PROYECTO 1981

# BLUEPRINTS

FOR REFORM

SCIENCE, MATHEMATICS, AND TECHNOLOGY EDUCATION



AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

PROJECT 1981

SCIENCE LITERACY FOR

---

A CHANGING FUTURE

---

*Mathematics*

*Natural Sciences*

*Social Sciences*

*Technology*



**U.S. Department of Education**  
Office of Educational Research and Improvement (OERI)  
National Library of Education (NLE)  
Educational Resources Information Center (ERIC)

SE063944  
**ERIC**

## REPRODUCTION RELEASE

(Specific Document)

### I. DOCUMENT IDENTIFICATION:

Title: UPDATE 1998-99 PROJECT 2061 SCIENCE LITERACY FOR A CHANGING FUTURE	
Author(s): AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE (AAAS), PROJECT 2061	
Corporate Source: AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE	Publication Date: 1998

### II. REPRODUCTION RELEASE:

In order to disseminate as widely as possible timely and significant materials of interest to the educational community, documents announced in the monthly abstract journal of the ERIC system, *Resources in Education* (RIE), are usually made available to users in microfiche, reproduced paper copy, and electronic media, and sold through the ERIC Document Reproduction Service (EDRS). Credit is given to the source of each document, and, if reproduction release is granted, one of the following notices is affixed to the document.

If permission is granted to reproduce and disseminate the identified document, please CHECK ONE of the following three options and sign at the bottom of the page.

The sample sticker shown below will be affixed to all Level 1 documents

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY

Sample

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

1

Level 1



Check here for Level 1 release, permitting reproduction and dissemination in microfiche or other ERIC archival media (e.g., electronic) and paper copy.

The sample sticker shown below will be affixed to all Level 2A documents

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL IN MICROFICHE AND IN ELECTRONIC MEDIA FOR ERIC COLLECTION SUBSCRIBERS ONLY, HAS BEEN GRANTED BY

Sample

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

2A

Level 2A



Check here for Level 2A release, permitting reproduction and dissemination in microfiche and in electronic media for ERIC archival collection subscribers only

The sample sticker shown below will be affixed to all Level 2B documents

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY

Sample

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

2B

Level 2B



Check here for Level 2B release, permitting reproduction and dissemination in microfiche only

Documents will be processed as indicated provided reproduction quality permits.  
If permission to reproduce is granted, but no box is checked, documents will be processed at Level 1.

I hereby grant to the Educational Resources Information Center (ERIC) nonexclusive permission to reproduce and disseminate this document as indicated above. Reproduction from the ERIC microfiche or electronic media by persons other than ERIC employees and its system contractors requires permission from the copyright holder. Exception is made for non-profit reproduction by libraries and other service agencies to satisfy information needs of educators in response to discrete inquiries.

Sign  
here,→  
please

Signature: <u>Mary Koppal</u>	Printed Name/Position/Title: MARY KOPPAL, COMMUNICATIONS DIRECTOR
Organization/Address: AAAS, PROJECT 2061 1333 H STREET, NW WASHINGTON, DC 20005	Telephone: 202-326-6666 FAX: 202-842-5196
	E-Mail address: MKoppal@AAAS.org Date: 3/21/01